

Naval Dental Research Institute

NDRI-PR 94-08
MARCH 1995



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Naval Medical Research and Development Command
Bethesda, Maryland

19950629 004

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NAVAL DENTAL RESEARCH INSTITUTE
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SUMMARIES OF RESEARCH
Fiscal Year 1993

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These summaries cover research carried out from 01 October 1992 through 30 September 1993.

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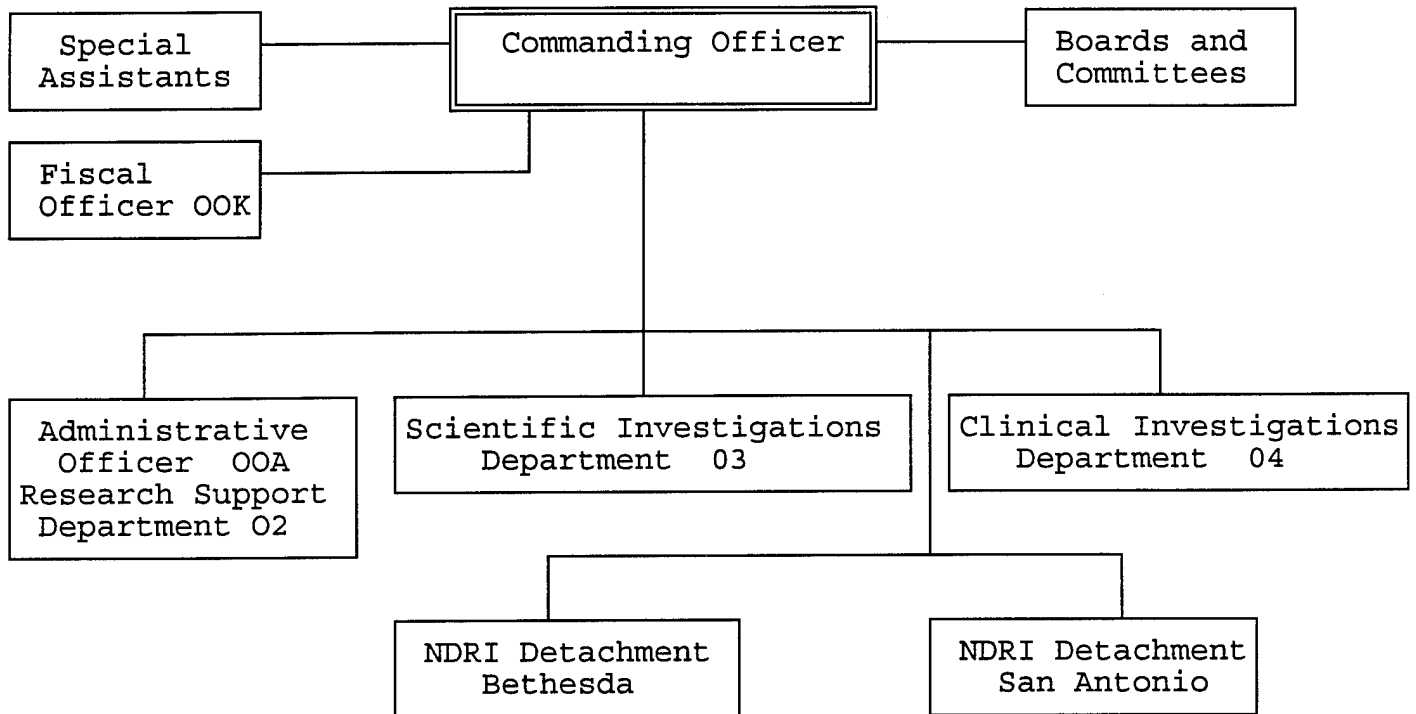
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NAVAL DENTAL RESEARCH INSTITUTE



COMMAND OVERVIEW

COMMAND

The Naval Dental Research Institute was officially established on 01 January 1967 with an Officer-in-Charge. The Institute was developed from the Dental Research Facility, which was a division of the Dental Department, Naval Administrative Command, Naval Training Center, Great Lakes. The Institute became a fourth echelon command on 17 August 1969 under a Commanding Officer. The command is under the direction of the Naval Medical Research and Development Command.

MISSION

The Institute is responsible for conducting research, development, testing and evaluation in dental and allied sciences, with particular emphasis on the problems of the fleet and field dentistry and on dental and oral health in Navy and Marine Corps populations.

PERSONNEL

As of 30 September 1993, there were billets for eight commissioned officers and fourteen enlisted members. Additionally, twelve civilians were employed at the Naval Dental Research Institute.

ORGANIZATION

The Institute has undergone reorganization since 1967. The current organization of three major Departments is reflected on the preceding page. The Scientific Investigations Department consists of the Microbiology, Immunology and Molecular Biology Divisions. Respectively, they carry out required microbiological, immunological and bacteriological analyses; biochemical studies of etiological agents and of host factors involved in oral diseases; assistance, advice and preparation of specimens for histological analysis; and research in the field of laboratory animal medicine and dentistry. The Clinical Investigations Department conducts research related to prevention and treatment of infections, problems of dento-alveolar trauma and injury, and the delivery of optimal dental care for the naval population. The Research Support Department consists of Administrative, Veterinary Sciences, and Material Management Divisions. The Research Support Department provides the Institute with administrative, library, veterinary research, fiscal and supply services, and equipment and facility maintenance.

STATEMENT OF SIGNIFICANT ACCOMPLISHMENTS

NAVAL DENTAL RESEARCH INSTITUTE

Objectives: Dental treatment needs and emergencies continue to afflict Navy and Marine Corps personnel and impact on operations. For over 20 years, annual lost-man days have remained essentially unchanged. The NDRI Scientific Investigations Department has continued studies aimed at improving military readiness by developing assays for human host factors and pathogenic bacterial antigens, DNA, and enzymes which can thereby identify personnel at high risk of dental emergencies.

Approach: The problem of dental emergencies is currently addressed through the following three areas of study: (1) epidemiologic assessment of dental treatment needs, oral diseases and their complications (2) evaluation of current and alternate methods to assist in the diagnosis and documentation of oro-facial disease entities and (3) evaluation of methodologies to promote dental wellness and improve dental readiness. Naval personnel provide oral health data through questionnaires, direct examinations and specimens.

SCIENTIFIC INVESTIGATIONS DEPARTMENT

--- A MIDI-Microbial Identification System has been brought on-line during FY93. The system is based on the identification of microorganisms according to their fatty acid contents. A fatty acid profile is like a fingerprint analysis of cell associated fatty acids considering presence or absence; quantities; ratios; etc. High resolution capillary gas chromatography is the means of analysis after samples are extracted as fatty acid methyl esters. The system is rapid and inexpensive and can be used to identify clinical microbes, aerobes, anaerobes, yeasts, mycobacteria, etc. This system represents an important asset for identifying medically important bacteria of interest to the entire Naval Medical Research and Development Command.

--- Samples from Egyptian rapidly progressing periodontitis patients have been screened for Porphyromonas gingivalis and Treponema denticola and the data forwarded to LCDR D. Lloyd for further analysis.

--- Treponema denticola strain e' (obtained from Dr. E. Chan, McGill University) is reported to contain a plasmid (E. Chan, personal communication). A plasmid, tentatively named pTd-4, was isolated from T. denticola e'. Preliminary characterization of pTd-4 indicates pTd-4 is similar to T. denticola 33520 plasmid pTd-1. It is the same size as pTd-1, has the same restriction pattern using six endorestriction nuclease digests, and Southern

STATEMENT OF SIGNIFICANT ACCOMPLISHMENTS (Continued)

SCIENTIFIC INVESTIGATIONS DEPARTMENT

blots using pTd-1 as probe show very strong homology between pTd-1 and pTd-4. This may be the first example of an identical Treponema plasmid existing naturally in two separate, serologically distinct, serovars of T. denticola. Strain T. denticola 33520 is serovar type C. Strain T. denticola e' is serovar type A.

--- Additional samples from Egyptian rapidly progressing periodontitis patients, 10 diseased and 10 healthy, have been screened for Treponema denticola and the four serovars of T. denticola. The data has been forwarded to Dr. Chris Cutler, University of Texas, Health Science Center at Houston, TX for further analysis and reporting.

--- Completed the Cavi-Med Study, a CRDA that was done in collaboration with the Northwestern University Dental School. 661 patient samples were analyzed by ELISA for Treponema denticola and Porphyromonas gingivalis antigen content.

--- Completed the analysis of the first set of subgingival plaque samples from NAMRU-3 (LCDR Lloyd) in Cairo, Egypt. They were analyzed for Treponema denticola, Eikenella corrodens, Campylobacter rectus, and Porphyromonas gingivalis.

--- Completed the specificity screen to the monoclonal antibodies produced by Southern Biotech Associates to Prevotella intermedia. The contractor produced antibodies lacked specificity and were determined to be of little value.

--- Molecular Biology of Treponema socranskii: Treponema socranskii sp. Characterization and Cloning. Polyclonal rabbit antisera were generated for use in screening and characterizing each subspecies of T. socranskii: T. socranskii, subsp. socranskii; T. socranskii subsp. buccale; and T. socranskii subsp. paredis.

--- Work was initiated on antibiotic Resistance of Treponema denticola: Comparison of plasmid bearing strains with strains lacking plasmids. Experiments to determine the most efficient method of establishing a lawn of bacteria have begun. The growth of T. denticola 33520 has been compared using three different semi-solid media: 1186, NOS, and spiolate; by spread and pour technique. The relative sensitivity or resistance, to various antibiotics, of T. denticola strains 33520, 35404, 33521, ST10, T32A, and D3A1 will be compared. Antibiotics to test include ampicillin, erythromycin, chloramphenicol, cephalosporin, and others.

STATEMENT OF SIGNIFICANT ACCOMPLISHMENTS (Continued)

SCIENTIFIC INVESTIGATIONS DEPARTMENT

--- Initiated genomic library construction in expression vector Lambda Zap-II, using T. denticola 33521. Lambda Zap-II is an expression cloning vector allowing for insertion and induced expression of short DNA fragments (1-10kb). Six libraries were constructed with T. denticola 33531 genomic DNA and are currently being screened by plaque-immunolift, for T. denticola antigens.

--- Subgingival paper point plaque samples (3,300) from HIV-positive patients have been collected and received from NIH/Jackson Foundation and SUNY-Buffalo. These samples will be quantitatively analyzed for certain periodontopathic bacteria in subsequent periods.

--- The Commanding Officer and Dr. Simonson flew to California seeking a private industrial collaboration with a diagnostic kit manufacturer. The company is willing to build a prototype rapid diagnostic chairside kit for T. denticola detection. Reagents, including an affinity purified rabbit capture antibody; affinity purified monoclonal antibodies; and standard spirochete antigens, have already been sent for kit production.

--- Nucleotide sequencing of Treponema denticola plasmids, discovered at NDRI, pTD2 and pTD3 has been completed (Lark Sequencing Technologies, Inc.). Databases Genbank R75.0 and EMBL R34.0 were searched for homologous DNA sequences. pTD2 is 2649 base pairs (bp) in length and 97% homologous with pTD1 (2647 bp long, 63 total base changes). pTD2 contains the open reading frames (ORF) ORFA and ORFB of pTD1. ORFA is truncated by 28 amino acids at the C-terminal and ORFB differs by 7 amino acid residues. pTD3 is 2032 bp in length and shares a region of 436 bp (95%) homologous with pTD1 and pTD2 outside of ORFA and ORFB and no more than random homology over the rest of its sequence. pTD3 has four possible ORFs coding for proteins 29,14,11 and 9.6 Kd. A protein homology search in the databases SWISS-PROT R24.0 and PIR R35.0 reveal homology with replication (rep) proteins from Bacillus spp., Lactobacillus spp., Staphylococcus spp., and Mycoplasma spp., similar to pTD1 and pTD2. In summary, pTD1 and pTD2 are nearly identical, and share a 417 bp homology with pTD3. pTD3 also has ORFs similar to pTD1 and pTD2, coding for proteins found in unrelated species of bacteria.

--- A unique assay has been developed to detect protease activity associated with whole intact bacteria, using fluorescence polarization methodology. The methodology has been developed in collaboration with Dr. Michael Jolley of Jolley Consulting and Research, Round Lake, Illinois. The uniqueness is in the ability to detect proteolytic activity on whole live bacteria in

STATEMENT OF SIGNIFICANT ACCOMPLISHMENTS (Continued)

SCIENTIFIC INVESTIGATIONS DEPARTMENT

a matter of minutes, whereas most assays to date require a couple of hours. The sensitivity of the assay is such that an individual plaque sample can be assayed in 5 minutes or a group of 10 samples in a 15 minute period. This would allow samples from several sites in one patient to be analyzed simultaneously. The assay requires the use of a fluorescence polarization analyzer (on loan to us at present) which, at least in the near future, will limit the usefulness to research projects, but if manufactured in quantity and simplified in design, which is possible to do, might become practical chairside instruments for dentists and assistants to use. The substrate is already available commercially.

--- Several species of oral bacteria are known to possess external proteolytic enzymes, which probably serve as aids in making available appropriate nutrients for their growth. In addition, these external proteases may act as virulence factors against the host. One identifying characteristic of Treponema denticola and Porphyromonas gingivalis is the trypsin-like activity first described using Azocoll as a substrate. More recently, electron-microscopic studies using particle-gold labeled antibodies to purified trypsin-like and chymotryptic-like enzymes isolated from these oral microorganisms, have shown that the proteases are located on the surface of the bacterial outer membrane. To date, assays of proteolytic activity mainly have been made on bacterial lysates or sonicates, which would also include intracellular enzymes in the estimate of protease activity. Internal proteases provide various "housekeeping" functions to maintain cellular homeostasis and probably would not be related directly to the virulence of the bacteria. Therefore, it was thought important to measure these activities independently. This fluorescence polarization method is a way to measure the external protease activity in a rapid manner and to use a substrate which may resemble the natural substrates that the bacteria normally use. Casein, labeled with a fluorescent tag, fluorescein isothiocyanate (FITC-casein), is used as substrate. We have found that several strains of Treponema denticola and Treponema socranskii, but not Treponema vincentii or Treponema phagedenis will degrade the FITC-casein. There is variability in potency of the protease activity among the positive strains. In future studies we will test for specific inhibitors or activators which might distinguish the bacterial protease activity from oral proteases derived from neutrophils, endothelial cells and monocytes/macrophages.

--- Dr. Cha has completed her study of the levels of PMN-elastase in host GCF and tissues, and the enzymes inhibition by

STATEMENT OF SIGNIFICANT ACCOMPLISHMENTS (Continued)

SCIENTIFIC INVESTIGATIONS DEPARTMENT

α -2-macroglobulin and α -1-antitrypsin. Dr's. Sebastiani, Stanke and Whitener continue evaluating the levels of host response factors in saliva.

--- An improvement in the method of estimating T. denticola concentration by spectrophotometry was made. Within the absorbance range of approximately 1.8 to 0.01, a log-transformed plot of either cells/ml or micrograms wet weight of T. denticola versus absorbance yields a straight line by linear regression ($r = 1.00$). From the regression line a formula was derived for the calculation of concentrations of T. denticola. Using the formula value for concentration of suspensions were reasonably close to those published by other investigators.

--- The study of total and enzyme inhibitor-bound levels of PMN elastase in GCF was completed. (Enzyme inhibitors examined were α -1-antitrypsin (AAT) and α -2-macroglobulin (A2M)).

--- The study of salivary PMN elastase and myeloperoxidase levels bound to the inhibitors AAT and A2M in the saliva of both healthy and periodontally diseased volunteers has been completed. Additionally, the levels of AAT, A2M, C-reactive protein, PMN cathepsin-G and interleukin-6 in the saliva of these volunteers were determined. Prior to these studies only C-reactive protein had been detected in saliva during a study conducted in conjunction with the Clinical Investigations Department of the NDRI.

--- The ability of Treponema denticola (Td) strains to influence immune responses may be an important factor in determining virulence. Salmonella minnesota lipopolysaccharide (LPS) a potent mitogen, was shown to stimulate the in vitro PFC response in a dose-related manner between 1 ng and 1 μ g/ml. Formalin-killed ATCC Strain 33520 of T. denticola shows a potent adjuvant effect which is sensitive to mild heating (55°) unlike LPS, while it is inhibitable by polymyxin B, like LPS. Heating did not increase the number of clumps found in Td preparations, therefore the heat-induced change in the adjuvant effect was not caused by aggregation. Therefore the adjuvant activity of T. denticola shares only some characteristics with S. minnesota LPS. Efforts to further elucidate the adjuvant activity of T. denticola are under way. Such differences may bear on differences in the virulence of different strains and serovars, as tested in animal models, and as detected in diseased periodontal sites.

Methods were worked out for fractionating Treponema denticola (Td) using sonication of cells, followed by isolation of insoluble and soluble fractions. Soluble and insoluble

STATEMENT OF SIGNIFICANT ACCOMPLISHMENTS (Continued)

SCIENTIFIC INVESTIGATIONS DEPARTMENT

sonicates of Treponema vincentii a relatively nonvirulent oral spirochete, showed little inhibitory or stimulatory effect on in vitro PFC responses in initial test.

In order to reduce the variability of plaque forming cell (PFC) responses to killed Td from one experiment to the next, the effect of varying the immunizing dose of sheep erythrocytes was tested both with the in vivo priming dose, and the subsequent in vitro dose of cells. In vivo it was found that increasing the dose beyond 20% had little effect on initial PFC response while PFC response declined below 3.2%. Subsequent in vitro PFC response to killed Td varied only slightly between 50% and 1.25%. We concluded that immunizing dose was not a major factor in response variability.

--- The production of monoclonal antibodies to the three subspecies of Treponema socranskii is in progress. Monoclonal antibody TSS already has been made against Treponema socranskii subspecies socranskii. For Treponema socranskii subspecies buccale, bacterial antigen has been produced from cultures of three distinct strains and a mixture of these antigens injected into 19 mice on several occasions according to a specified schedule over a 12-week period. Splenocytes will be removed from these immunized mice and fused with long-term hybridoma cultures kept in our laboratory. The fusion should result in a few monoclonal-producing cell lines stable enough to keep in passage. These will have to be tested extensively using ELISA techniques to determine their specificities and one or two optimum lines chosen to retain for monoclonal antibody production specific for TSB. As to Treponema socranskii subspecies paredis, it has been difficult to obtain sufficient growth of bacteria at this time to obtain the quantity of antigen necessary to proceed with immunization. We will try different kinds of growth media and proceed from there.

--- Clinical diagnostic methods in use today lack sufficient sensitivity, specificity, and predictability to be clinically useful for early detection and targeted intervention of destructive periodontal disease. As a result, we have incorporated computerized digital subtractive radiography (DSR) into our protocols. A number of current studies indicate that DSR has sufficient resolution to identify active bone destruction. DSR, in concert with biochemical assays, may provide a solution to the above problems, as well as many other long-debated questions such as the episodic nature of bone destruction due to periodontal disease. A DSR system has been designed and purchased. A method for generating intraoral rat radiographs that are suitable for longitudinal subtraction

STATEMENT OF SIGNIFICANT ACCOMPLISHMENTS (Continued)

SCIENTIFIC INVESTIGATIONS DEPARTMENT

analysis has been developed. Methods of significantly improving image quality have been achieved through the use of a custom packaged, high resolution film. Pilot studies applying this innovative technology to our in-house rat studies are nearing completion.

--- A study evaluating the effects of diet on the establishment of human periodonto-pathogens in the gnotobiotic Sprague-Dawley rat has been completed. Preliminary results are very promising. A study evaluating the same hypothesis has been initiated in our in-house facility.

STATEMENT OF SIGNIFICANT ACCOMPLISHMENTS (Continued)

CLINICAL INVESTIGATIONS DEPARTMENT

- Data from Naval Academy Classes of '92 and '94 continues to be collected to evaluate eruption patterns and morbidity associated with retention and extraction of third molars.

- Dental treatment needs data from over 1400 Marine Corps Reserve personnel activated for Operations Desert Shield/Storm were collected. Manuscript preparation is in progress.

- An abstract entitled "Dental Restorative Needs Determined With and Without Dental Radiographs" was presented at the 22nd annual meeting of the AADR held in Chicago, IL in March 93. Data from more than 450 dental exams have been collected.

- Developed and completed a pilot program for centrally-managed health care delivery which has been adopted by BUMED for Navy-wide implementation (Phased Dentistry).

- NDRI created Phased Dentistry Guidelines utilizing DoD criteria for the Initial Recruit Examination. Meaningful criteria to assess third molars, Periodontal Screening and Recording and defined objective criteria to measure incremental caries progression have resulted in revision of MANMED chapter 6 dental classification system, Navy-wide implementation of the modified PSR system, and a new SECNAV instruction to define dental health and readiness standards.

- Beginning in May 1993 and ending on 1 Oct 1993, there were 4571 recruits from 66 companies evaluated in the Phase I pilot study at NTC, Orlando, FL. Incoming recruit dental readiness was transformed from 18.5% at inprocessing to 85.8% upon graduation. The Phase I conversion from dental class 3 to class 1 or 2 was 57.3%. The majority of the remaining dental class 3 patients required oral surgery or oral prophylaxes.

- Developed a prototype longitudinal radiographic and computerized digital subtractive radiography system.

- Developed amalgam/heavy metal separator unit with patentable technology.

- Developing voice-activated dental record system to facilitate epidemiological research and real time data collection.

- Developed software exam criteria for computerized exam. Purchased "Dentrix" exam system.

STATEMENT OF SIGNIFICANT ACCOMPLISHMENTS (Continued)

CLINICAL INVESTIGATIONS DEPARTMENT

- Developed and evaluated a modified Periodontal Screening Record for recruit use, which has now been adopted for use Navy-wide.

- Demonstrated a preliminary therapeutic and preventive use of antioxidants.

- A "Recruit Guideline" program was prepared for Naval Dental Center, Great Lakes, Illinois. This program contained material to establish a standard for performing recruit in-processing dental examinations. The program was presented in a slide presentation format followed by written questions ranging in topic from clinical dentistry to SECNAVINST.

- Developing, in collaboration with NASA, a method of applying ultrasound technology to dental diagnosis and disease identification.

- Ongoing investigations with National Institutes of Standards and Technology of restorative materials and ceramics.

- Applied 3-D quantitative computer visualization of soft and hard tissues to both oral surgery and orthopedic diagnosis.

- First to perform comprehensive Navy-wide Reserve treatment needs profile.

- Data from 4776 Marine dental emergencies for troops ashore in Operations Desert Shield/Storm were collected. An abstract entitled "Dental Emergencies among Marines Ashore in Operations Desert Shield/Storm" was prepared. These Marine dental records are being located to determine what dental treatment occurred prior to the emergency.

- Completed comprehensive profile of male and female recruit treatment needs.

- Continued collection of data from the second of a three year prospective sealant study on Navy recruits. An abstract titled "Sealant Application in a Young Military Population" was submitted. Data for the abstract was based on preliminary results.

- Continued collection of data from the third of a four year prospective study from the Naval Academy. The study is designed to evaluate eruption patterns and morbidity associated with retention and extraction of third molars.

STATEMENT OF SIGNIFICANT ACCOMPLISHMENTS (Continued)

NDRI DETACHMENT BETHESDA, MARYLAND

The primary mission of the Naval Dental School involves meeting the requirements for postgraduate specialty training which includes a required "research experience" for accreditation of the program. To this end, resident research efforts are channeled into areas which have the most potential for benefit to the Navy dental community. Research goals and program focus can be summarized in three categories: risk assessment, disease intervention, and strategies for maximizing wellness. The approved NMRDC Work Unit (63706N.M0095.006-3014) covering this research effort is entitled: "Evaluation of New Dental Materials, Equipment, Drugs, and Procedures for Naval Dentistry".

Seventy research projects are currently underway involving 81 staff and resident investigators and nine major non-Navy collaborations. Topics include dental materials testing for both operative and prosthodontic needs, endodontic technique evaluations, periodontal surgery clinical trials, periodontal microbiology and immunology, periodontitis and caries risk assessments, pathogenesis studies of periodontal infections, use of 3-dimensional computer visualization in patient evaluation and treatment planning, and a DoD-sponsored tri-service study of dental treatment needs of recruit and active duty populations.

ADDENDUM TO
SUMMARIES OF RESEARCH - FISCAL YEAR 1993

WORK UNITS

63706N M0095.006-0003 - Evaluation of New Methods to Prevent and
Treat Dental Emergenecies in Naval Personnel

62787A 3M162775A825 - Development of an Animal Model to Study
Periodontal Disease

61102A 3M161102.BS10-DA-440-0 - Development and Evaluation of
Methods to Prevent or Intercept Acute Dental Conditions

61153N MR0412.002-0051 - Host Responses to Periodontopathic
Microorganisms in Navy and Marine Corps Personnel

63706N M0095.06-3014 - Evaluation of New Dental Materials,
Equipment, Drugs, and Procedures for Naval Dentistry

SCIENTIFIC JOURNAL PUBLICATIONS

Yotis, W., Keene, L., Hoerman, K., and Simonson L. G. Fatty acid profiles of the outer membrane of ATCC strains 35405, 35404, and 33521 of Treponema denticola. Journal of Periodontal Research 23:387-395, 1993.

Nilius, A. M., Spencer, S. C., and Simonson, L. G. Stimulation of in vitro growth of Treponema denticola by extracellular growth factors produced by Porphyromonas gingivalis. Journal of Dental Research 72:1027-1031, 1993.

Bajuscak, R. E., Hall, E. H., Giambarresi, L. I., and Weaves, T. Bacterial contamination of dental radiographic film. Oral Surgery Oral Medicine Oral Pathology 72:661-663, 1993.

Curtis, S. R., Richard, M. W., and Meiers, J. C. Early erosion of glass-ionomer cement at crown margins. International Journal of Prosthodontics 6:553-557, 1993.

Pederson, E. D., Miller, J. W., Matheson, S., Simonson, L. G., Chadwick, D. E., Covill, P. J., Turner, D. W., and Morton, H. E. Trypsin-like activity levels of Treponema denticola and Porphyromonas gingivalis in adults with periodontitis. Journal of Clinical Periodontology (in press) 1993.

Gopalsami, C., Yotis, W., Corrigan, K., Schade, S., Keene, J., and Simonson, L. G. Effect of outer membrane of Treponema denticola on bone resorption. Oral Microbiology and Immunology 8:121-124, 1993.

Schade, S. Z., Yotis, W. W., Gopalsami, C., Keene, J. J., Spear, G. T., and Simonson, L. G. Mitogenic and complement stimulating activity of the outer membrane of Treponema denticola. (submitted for publication), 1993.

Melvin, L., Assad, D., Miller, G., Gher, M., Simonson, L. G. and York, A. Comparison of DNA probe and ELISA microbial analysis methods and their association with adult periodontitis. (submitted for publication), 1993.

Geivelis, M., Turner, D. W., Pederson, E. D. and Lamberts, B. L. Measurements of interleukin-6 in gingival crevicular fluid from adults with destructive periodontal disease. Journal of Periodontology (in press) 1993.

Rauschenberger, C. R., McClanahan, S. B., Pederson, E. D., Turner, D. W., and Kaminski, E. J. Comparison of human PMN elastase, PMN cathepsin-G and alpha-2-macroglobulin levels in healthy and inflamed dental pulps. Journal of Endodontics (in press) 1993.

SCIENTIFIC JOURNAL PUBLICATIONS
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Lafferty, T. L., Gher, M. E., Gray, J. A. Tetracyclines and citric acid etching of root surfaces. Journal of Periodontology 64:689-693, 1993.

Fucini, S. E., Quintero, G., Gher, M. E., Black, B. S., and Richardson, A. C. Small versus large particles of demineralized freeze-dried bone allografts in human intrabony periodontal defects. Journal of Periodontology 64:844-847, 1993.

Jahnke, R. V., Sandifer, J. B., Gher, M. E., Gray, J. L., and Richardson, A. C. Thick free gingival and connective tissue autografts for root coverage. Journal of Periodontology 64:315-322, 1993.

Kelly, J. R., Cohen, M. E., and Tesk, J. A. Error propagation biases in the calculation of indentation fracture toughness for ceramics. Journal of Ceramics Soc 76:2665-2668, 1993.

Meadows, C. L., Gher, M. E., Quintero, G., and Lafferty, T. A. A comparison of polylactic acid granules and decalcified freeze-dried bone allograft in human periodontal root surfaces. Journal of Periodontology 64:103-109, 1993.

Saiku, J. M., St. Germain, H., and Meiers, J. C. Microleakage of a dental amalgam alloy bonding agent. Operative Dentistry 18:172-178, 1993.

Tesk, J. A., Antonucci, J. M., Eichmiller, F., Kelly, J. R., Rupp, N. P., Fraker, A., Chow, L., Stansbury, J. W., and Parry, E. Dental Materials Chapter in JI Kroschwitz and M Howe-Grant (eds.): Encyclopedia of Chemical Technology 4th ed., New York, John Wiley & Sons, Inc., 7:946-1022, 1993.

Todd, A. D., Gher, M. E., Quintero, G., and Richardson, A. C. Interpretation of linear and computed tomograms in the assessment of implant recipient sites. Journal of Periodontology 64:1243-1249, 1993.

Turck, M. O., Richards, M. W. Microwave processing for denture relines, repairs, and rebases. Journal of Prosthetic Dentistry 69:340-343, 1993.

Turner, C. W., and Meiers, J. C. Repair of an aged, contaminated indirect composite resin with a direct, visible-light-cured composite resin. Operative Dentistry 18:187-194, 1993.

SCIENTIFIC JOURNAL PUBLICATIONS
(Continued)

York, A. K., and Arthur, J. S. Determining the HIV status of patients of three HIV-positive Navy dentists. Journal of American Dental Association 124:74-77, 1993.

York, A. K., and Arthur, J. S. Reasons for placement and replacement of dental restorations in the United States Navy Dental Corps. Operative Dentistry 18:203-208, 1993.

RESEARCH PROGRESS REPORTS

- NDRI-PR 93-01 A Sensitive Method for Detection of Immune Complexes in Human Gingival Crevicular Fluids
- NDRI-PR 93-02 Stimulation Study of Methods to Detect Periodontal Associations When They Are Inconsistent Among Subjects
- NDRI-PR 93-03 Effect of Dietary Vitamin E Supplementation and Rotational Stress on Alveolar Bone Loss in Rice Rats
- NDRI-PR 93-04 Stimulation of In vivo Growth of Treponema denticola by Extracellular Growth Factors Produced by Porphyromonas gingivalis
- NDRI-PR 93-05 Summaries of Research Fiscal Year 1992

**FORMAL PRESENTATIONS MADE AT MEETINGS OF SCIENTIFIC
SOCIETIES/GROUPS**

MARCH 1993

The following presentations were given at the 22nd Annual Session of the American Association for Dental Research and the 71st General Session of the International Association for Dental Research held March 10-14 in Chicago, Illinois.

Melvin, W., D. Assad, G. Miller, M. Gher, L. Simonson, and A. York. Comparison of DNA hybridization and ELISA microbial analysis. (Abstract #2443) J. Dent. Res. 72:409, 1993.

Steele, M. G., L. G. Simonson, and W. Yotis. Adjuvant effect of Treponema denticola strains on an in vitro immune response. (Abstract #615) J. Dent. Res. 72:180, 1993.

Gopalsami, C., S. Schade, W. Yotis, L. G. Simonson, and J. Keene, Jr. Human antibodies to Treponema denticola match murine monoclonals. (Abstract #613) J. Dent. Res. 72:180, 1993.

Whitaker, E. J., C. Scott, B. F. Hammond, L. G. Simonson, R.W. Colman. Kininogenase activity of plaque & selected periodontal pathogens. (Abstract #2468) J. Dent. Res. 72:412, 1993.

Cha, J. S. PMN-Elastase Inhibition by α_2 -Macroglobulin and α_1 -Antitrypsin in GCF. (Abstract #530) J. Dent. Res. 72:170, 1993.

Covill, P. J. and Pederson, E. D. Detection of Myeloperoxidase [Total & Inhibitor-Bound] in Human Saliva. (Abstract #2367) J. Dent. Res. 72:399, 1993.

Sebastiani, P. T., Pederson, E. D. and Turner, D. W. PMN-Elastase Levels in Human Saliva by an ELISA Procedure. (Abstract #2412) J. Dent. Res. 72:405, 1993.

Stanke, S. R., Pederson, E. D. and Turner, D. W. Interleukin-6 and α_2 -Macroglobulin Levels in Human Saliva. (Abstract #2413) J. Dent. Res. 72:405, 1993.

Whitener, S. J., Pederson, E. D. and Turner, D. W. C-Reactive Protein and α_1 -Antitrypsin Levels in Human Saliva. (Abstract #532) J. Dent. Res. 72:170, 1993.

Alexander, D. C. Caries Experience and Restorative Treatment Needs of U.S. Navy Recruits. (Abstract #719) J. Dent. Res. 72:193, 1993.

**FORMAL PRESENTATIONS MADE AT MEETINGS OF SCIENTIFIC SOCIETIES/
GROUPS (Continued)**

Handler, H. J., Johnston, A. D. Aging Effects on Shear Bond Strengths to Dentin. (Abstract #1286) J. Dent. Res. 72:264, 1993.

Black, B. S., Gher, M. E., Sandifer, J., Fucini, S. E., and Richardson, A. C. Collagen and Polytetrafluoroethylene Membranes Compared in Human Furcation Defect Treatment. (Abstract #1145) J. Dent. Res. 72:246, 1993.

Gher, M. E., Quintero, G., Sandifer, J., Assad, D. Bone Grafting and GTR with Immediate Dental Implants in Humans. (Abstract #1657) J. Dent. Res. 72:310, 1993.

Brown, T., Johnston, A. D., and Bennett, P. Comparison of Dentin Bond Strengths Obtained with Para-Substituted NPG Derivatives. (Abstract #1432) J. Dent. Res. 72:282, 1993.

Dury, D. C., York, A. K., and Hall, E. H. Application of the "Fixed Role Hypothesis" in Patients with Temporomandibular Disorders. (Abstract #1686) J. Dent. Res. 72:314, 1993.

Fucini, S. E., Quintero, G., Gher, M. E., Black, B. S., and Richardson, A. C. Small vs. Large Particles of DFDBA in Human Intrabony Periodontal Defects. (Abstract #832) J. Dent. Res. 72:207, 1993.

Kelly, J. R., Harvey, C. K., Clark, M., and Tesk, J. A. Hertzian-Cone Cracks as Failure-Origins During In Vitro Testing. (Abstract #667) J. Dent. Res. 72:187, 1993.

Kelly, J. R., Sorensen, J. A. Failure Origins and Stresses During Testing of In-Ceram FPD's. (Abstract #1536) J. Dent. Res. 72:295, 1993.

Marinelli, S. M., Eichmiller, F. Comparing Three Dimensional vs. Two Dimensional Evaluation of Microleakage in Composite Restorations. (Abstract #748) J. Dent. Res. 72:197, 1993.

Martin, J. C., Alexander, D. C. Site Temperature and BANA Hydrolysis Associated with Treatment of Periodontitis. (Abstract #1111) J. Dent. Res. 72:242, 1993.

Melvin, W., Assad, D., Miller, G., Gher, M., Simonson, L., and York, A. Comparison of DNA Hybridization Probe and ELISA Microbial Analysis. (Abstract #2443) J. Dent. Res. 72:409, 1993.

**FORMAL PRESENTATIONS MADE AT MEETINGS OF SCIENTIFIC SOCIETIES/
GROUPS (Continued)**

Mitchell, J., Giambarresi, L., and Meiers, J. C. Effects of Air-Powder Prophylaxis on Composite Resin/Dentin Margins. (Abstract #1283) J. Dent. Res. 72:264, 1993.

Reeves, N., Gore, K., Meiers, J. C., and Kelly, J. R. Enamel Wear Against In-Ceram and Vitadur-N with Various Surface Finishes. (Abstract #665) J. Dent. Res. 72:187, 1993.

Richardson, A. C., Todd, A. D. Quantitative 3D-Volume Rendering in Surgical Treatment Planning and Oral Pathology. (Abstract #1914) J. Dent. Res. 72:342, 1993.

Tripp, G. A., Eichmiller, F. C., and Meiers, J. C. Surface Roughness of Glass-Ceramic Insert/Composite Resin After Polishing. (Abstract #759) J. Dent. Res. 72:198, 1993.

Turner, C. W., Meiers, J. C. Indirect Composite Resin Repair with a Visible Light Cured Composite. (Abstract #1444) J. Dent. Res. 72:284, 1993.

Vacek, J. S., Assad, D. A., Gher, M. E., Richardson, A. C., and Giambarresi, L. I. The Dimensions of the Human Dentogingival Junction. (Abstract #639) J. Dent. Res. 72:183, 1993.

York, A. K., Arthur, J. S. Reasons for Placement/Replacement of Dental Restorations in Navy Personnel. (Abstract #1029) J. Dent. Res. 72:232, 1993.

Cohen, M. E., Meyer, D. M. Effects of Vitamin E and Stress on Alveolar Bone Loss in Rice Rats. (Abstract #1839) J. Dent. Res. 72:333, 1993.

Kuehne, J. C., Sergeant, R. S., and Cohen, M. E. Clinical Evaluation of Autoclavable Low-Speed Dental Handpieces. (Abstract #219) J. Dent. Res. 72:131, 1993.

Simecek, J. W., Leal, F. R. Dental Restorative Needs Determined With and Without Bitewing Radiographs. (Abstract #329) J. Dent. Res. 72:145, 1993.

Anderson, D. M., Esquire, R. G., Clark, G. E., and Cohen, M. E. Relationship Between Degree of Caries Removal and Subsequent RCT of Extraction. (Abstract #675) J. Dent. Res. 72:188, 1993.

Kelly, J. R., Cohen, M. W., and Tesk, J. A. Error Propagation Bias in Indentation Estimates of K? (Abstract #1986) J. Dent. Res. 72:351, 1993.

**FORMAL PRESENTATIONS MADE AT MEETINGS OF SCIENTIFIC SOCIETIES/
GROUPS (CONTINUED)**

MAY 1993

Simonson, L. G., Braswell, L., Falkler, W., Laws, A., Lloyd, D., Lukehart, S., Riviere, G. Human oral spirochete antigens in certain animal populations. Abstracts of the 93rd General Meeting, American Society for Microbiology. (Abstract #D-133) 1993.

PARTICIPATION-IN PROFESSIONAL PROGRAMS AND OTHER MEETINGS

JANUARY 1993

MEYER, D. M., attended NMRDC's Protection of Human Subjects Meeting in Bethesda, Maryland.

CECIL, J., attended NIDR Council Meeting and NMRDC Orientation in Bethesda, Maryland.

SARAUER, B. J., attended Microbial Identification System training course in Newark, Delaware.

The following personnel assisted in collecting data and calibrating examiners in Orlando, Florida:

MEYER, D. M.

SIMECEK, J. W.

ALVAREZ, M. A., attended Wordperfect computer training in Rolling Meadows, Illinois.

FEBRUARY 1993

RODDY, W. C., attended the Academy of Operative Dentistry 1993 annual meeting in Chicago, Illinois.

The following personnel attended the Chicago Dental Society Midwinter Meeting in Chicago, Illinois:

CECIL, J.

STONE, M.

LEAL, F. R.

STEWART, S. P., attended STARS/FL training in Charleston, South Carolina.

MARCH 1993

SIMONSON, L. G., attended a meeting at the University of Wisconsin to work on contract in Madison, Wisconsin.

The following personnel attended the International Association for Dental Research in Chicago, Illinois:

CECIL, J.

SIMONSON, L. G.

SIMECEK, J. W.

COHEN, M. E.

LEAL, F. R.

PEDERSON, E. D.

REEDY, E.

STONE, M.

BOLDEN, J. A.

COVILL, P.

FRESCOLN, K.

THOMPSON, J. M.

PARTICIPATION IN PROFESSIONAL PROGRAMS AND OTHER MEETINGS
(Continued)

MARCH 1993 (Continued)

STEWART, S. P., attended the Navy Comptrollership course in Monterey, California.

KUEHNE, J., attended the ADA/ASC meeting, IADR meeting, and the NDRI Change of Command in Great Lakes, Illinois.

MEYER, D. M., attended the Recruit Dental Conference, CNET, in Pensacola, Florida.

STONE, M., attended Intermediate and Advance Wordperfect training course in Rolling Meadows, Illinois.

APRIL 1993

PORTIS, M. J., and HOGAN, W., attended Intro to Paradox computer training in Rolling Meadows, Illinois.

STEWART, S., attended STARS/FL training in Charleston, South Carolina.

BRYANT, E., attended Intro to Wordperfect and Overview of PC's computer training in Rolling Meadows, Illinois.

MEYER, D. M., attended the American Association of Endodontist meeting in Chicago, Illinois.

MEYER, D. M., and SIMECEK, J. W., attended NNEADS/Phased Dentistry in Charleston, South Carolina.

MAY 1993

RODDY, W. C., attended the Federal Services Board of General Dentistry Examination in Alexandria, Virginia.

COHEN, M. E., attended the Semi-Annual meeting of Task Force on Design and Analysis Inc. in New Brunswick, New Jersey.

SIMONSON, L. G., attended the 93rd American Society for Microbiology General meeting in Atlanta, Georgia.

KARAWAY, R., attended Intro to Wordperfect computer course in Rolling Meadows, Illinois.

REEDY, E., attended Combat Casualty Care Course as an MSC TAC Officer in San Antonio, Texas.

PARTICIPATION IN PROFESSIONAL PROGRAMS AND OTHER MEETINGS
(Continued)

MAY 1993 (Continued)

REEDY, E., and BOLDEN, J. A., attended Molecular Basis of Gene Expression Applied Biosystems in Chicago, Illinois.

RALLS, S. A., attended Commanding Officer's CNAVLEAD 92010 course in Leesburg, Virginia.

JUNE 1993

KARAWAY, R., attended Overview of PC's computer training in Rolling Meadows, Illinois.

RALLS, S. A., attended NIDR National Advisory Council meeting in Bethesda, Maryland.

BERGENER, C., and SCHADE, S. Z., attended Windows computer training in Rolling Meadows, Illinois.

KIVLEY, R., and KING, D. A., conducted Efficiency Review at NDRI Bethesda Detachment in Bethesda, Maryland.

FISHER, T. R., attended MacIntosh Survival course in Milwaukee, Wisconsin.

The following personnel attended the Northeastern Illinois Chapter of American Statistical meeting in Northbrook, Illinois:

MEYER, D. M.
LEAL, F. R.

COHEN, M. E.
STONE, M.

KUEHNE, J., attended the Office Sterilization and Asepsis Procedures Research Foundation Meeting in Charlotte, North Carolina.

JULY 1993

LEAL, F. R., attended INAVLEAD U.S. Navy in Little Creek, Virginia.

The following personnel visited the Naval Dental Research Institute, Detachment in San Antonio, Texas.

RALLS, S. A.
DUBOSE-LARDY, P. F.

MEYER, D. M.

STEWART, S., attended the Federally Employed Women's Training in Las Vegas, Nevada.

PARTICIPATION IN PROFESSIONAL PROGRAMS AND OTHER MEETINGS
(Continued)

AUGUST 1993

SCHADE, S. Z., attended training on MIDI Id System in Newark, Delaware.

BERGENER, C., attended Wordperfect, Macros, Tables and Forms computer course in Milwaukee, Wisconsin.

RODDY, W. C., attended software training for Digital Subtraction Radiography, in San Antonio, Texas.

COHEN, M. E., attended Periodontal Residents Statistics Seminar at the National Naval Dental Center in Bethesda, Maryland.

RALLS, S. A., attended S&T Review meetings in Fort Detrick, Maryland.

SEPTEMBER 1993

FISHER, T. R., attended Advanced Troubleshooting MacIntosh training in Chicago, Illinois.

RALLS, S. A., and SIMONSON, L. G., visited Disease Protection Inc. manufacturer in Los Angeles, California.

RODDY, W. C., visited Madison, Wisconsin to work on contract at the University of Wisconsin.

FISHER, T. R., attended Power Point computer training, and Intermediate Windows computer training in Rolling Meadows, Illinois.

MORTON, H. E., participated in Scientist at Sea program in Port Everglades, Florida.

MEYER, D. M., attended the Management Initiative for Increasing Recruit Readiness Seminar in Parris Island, South Carolina.

RALLS, S. A., attended the American Academy of Periodontology in Chicago, Illinois.

DISTINGUISHED VISITORS

FEBRUARY 1993

Dr. Dale W. Anderson, University of Missouri.

CAPT Robert L. Kjome, DC, USN, Naval Education and Training Command, Pensacola, Florida.

Surgeon CDR David C. Alexander, Naval Dental Research Institute, Detachment Bethesda, Maryland.

CAPT Robert J. Jucovics, DC, USN, Commanding Officer, Naval Dental Center, Newport, Rhode Island.

Mr. James R. Knight, Department of Defense, Inspector General Office, Hampton, Virginia.

Mr. Doug Jones, Department of Defense, Inspector General Office, Hampton, Virginia.

Ms. Mary Gibson, Department of Defense, Inspector General Office, Hampton, Virginia.

Dr. Hans Hofmann, Stuttgart, Germany.

CAPT John Sandknop, USN, Chief of Staff, Naval Training Center, Great Lakes, Illinois.

Ms. Kristie Meeker, OMBUDSMAN, Naval Dental Research Institute, Great Lakes, Illinois.

MARCH 1993

Mr. R. L. Martin, Bureau of Medicine and Surgery, Inspector General, Washington, DC.

Mr. Dmpicaid, Bureau of Medicine and Surgery, Inspector General, Washington, DC.

RADM Skip Collins, DC, USN, Chief Dental Officer, Rockville, Maryland.

COL Larry Bruestie, Fitzsimons Army Medical Center, Denver, Colorado.

LTC Dave Hopson, DCVS, Ft. Leonardwood, Missouri.

RADM Hugh P. Scott, MC, USN, Chief of Naval Operations, N-931, Washington DC.

DISTINGUISHED VISITORS (Continued)

MARCH 1993 (Continued)

CAPT E. T. Flynn, Jr., MC, USN, Commanding Officer of Naval Medical Research and Development Command, Bethesda, Maryland.

Dr. Monty Herron, GEO Centers, Ft. Washington, Maryland.

LCDR John C. Kuehne, DC, USN, Officer in Charge of Naval Dental Research Institute Detachment, San Antonio, Texas.

June 1993

CDR David Lardy, MSC, USN, Executive Officer of Naval Hospital Corps School, Great Lakes, Illinois.

Mr. Charles A. Spencer, Naval Hospital Corps School, Great Lakes, Illinois.

JULY 1993

RADM Todd Fisher, MSC, USN, Bureau of Medicine and Surgery, Washington, DC.

AUGUST 1993

COL Michael P. Rethman, USA, Walter Reed Army Institute of Dental Research, Washington, DC.

CAPT Tom Barco, DC, USN, Commanding Officer of Naval Dental Clinic, Great Lakes, Illinois.

Dr. Conrad Naleway, American Dental Association, Chicago, Illinois.

OCTOBER 1993

Commodore Ted Grant, RN, British Royal Navy.

Surgeon CDR David Alexander, Naval Dental Research Institute, Detachment, Bethesda, Maryland.

RADM Milton C. Clegg, DC, USN, (RET), Northwestern University, Dental School, Chicago, Illinois .

CAPT J. C. Cecil III, DC, USN, Executive Officer of Naval Medical Research and Development Command, Bethesda, Maryland.

**HONORS, AWARDS, POSITIONS HELD, CEREMONIES, STAFF ARRIVALS/
DEPARTURES AND REENLISTMENTS.**

JANUARY 1993

LT P. DuBose-Lardy checks aboard from Naval Reserve Recruiting Command, Great Lakes, Illinois.

LT D. Meeker received a Letter of Commendation from the Commanding Officer upon his departure.

FEBRUARY 1993

CAPT D. M. Meyer received a Letter of Appreciation from the Commanding Officer, Naval Dental Research Institute, Great Lakes, Illinois.

DT2 McKinnley Ramsey was awarded a Navy Achievement Medal.

MARCH 1993

DT2 R. G. Kivley was awarded a Navy Achievement Medal.

HM2 B. J. Sarauer was awarded a Navy Achievement Medal.

DT3 L. A. Puckett was awarded a Navy Achievement Medal.

The following personnel received a Letter of Commendation from the Commanding Officer for the outstanding work that was done in the Animal Colony for the AAALAC Inspection:

LT D. Meeker
LT E. Reedy
Colonel Johnson

DT1 W. Hogan
DT3 D. King

LT P. Dubose-Lardy received a Letter of Commendation from the Commanding Officer for professionalism and dedication.

Mrs. C. Meeker received a Letter of Appreciation from the Commanding Officer upon resigning as NDRI's OMBUDSMAN.

CAPT James C. Cecil III departs Naval Dental Research Institute, Great Lakes, Illinois to Naval Medical Research & Development Command, Bethesda, Maryland.

CAPT Stephen A. Ralls, reports as Commanding Officer of Naval Dental Research Institute, Great Lakes, Illinois.

**HONORS, AWARDS, POSITIONS HELD, CEREMONIES, STAFF
ARRIVALS/DEPARTURES AND REENLISTMENTS (Continued)**

APRIL 1993

CAPT J. S. Arthur was awarded a Meritorious Service Medal.

LCDR Wayne Deutsch reported aboard from 1st Dental Company, Camp Pendleton, California.

DT2 L. Morgan departed NDRI.

MAY 1993

HM2 K. Frescoln received a Letter of Commendation from the Commanding Officer upon his departure.

Mr. E. Bryant received a Letter of Commendation from the Commanding Officer upon his departure.

DT1 Bonnie Simons reported aboard from Naval Dental Center, Pearl Harbor, Hawaii.

HM2 J. Bolden received a Letter of Commendation from the Commanding Officer of Naval Hospital Corps School, Great Lakes, Illinois, for courageous actions.



Captain J. C. Cecil III, DC, USN, being piped
aboard for Change of Command Ceremony.

**HONORS, AWARDS, POSITIONS HELD, CEREMONIES, STAFF
ARRIVALS/DEPARTURES AND REENLISTMENTS (Continued)**

JUNE

CAPT Jonathan Fradkin, USAR, was awarded a Navy Achievement Medal.

HM3 J. Carter reported aboard from Port Hueneme, California.

DT1 W. Hogan received an Admiral's Letter of Commendation upon departure of NDRI and transferred to the Naval Branch Dental Clinic, Edzell, Scotland.

JULY 1993

DT1 Alvarez promoted to his present rank.

AUGUST 1993

LCDR DuBose-Lardy promoted to her present rank.



Captain S. A. Ralls, DC, USN, being piped aboard for Change of Command Ceremony.

**HONORS, AWARDS, POSITIONS HELD, CEREMONIES, STAFF
ARRIVALS/DEPARTURES AND REENLISTMENTS (Continued)**

SEPTEMBER 1993

LCDR W. M. Deutsch was awarded a Navy Commendation Medal from the Commanding Officer of the 1st Marine Expeditionary Force.

Mr. E. Pederson received a Letter of Commendation from the Commanding Officer for Civilian of the Half Year.

LT F. Leal received a Letter of Appreciation from the Commanding Officer for hard work and dedication.

DT1 M. Alvarez received a Letter of Commendation from the Commanding Officer for Sailor of the Half Year.

DT2 E. Dagnachew received a Letter of Commendation from the Commanding Officer for Sailor of the Year.

DT1 M. Alvarez reenlisted in the United States Navy for four years.

NOVEMBER 1993

The following personnel received a Letter of Appreciation from the Commanding Officer Naval Dental Center, Great Lakes, for their outstanding contributions for the Naval Dental Center Dining-Out.

LT F. Leal

Mr. E. Pederson

M. E. Stone received a Letter of Appreciation from the Commanding Officer for hard work and dedication.

DN Robert Ritch reported aboard from the USS Simon Lake, Italy.

DECEMBER 1993

HMC P. Mangaran was awarded a Navy Achievement Medal.

DT3 D. A. King was awarded a Navy Achievement Medal upon his transfer to the USS Gunston Hall, LSD-44.

M. E. Stone received a Letter of Commendation from the Commanding Officer for Civilian of the Half Year.

**HONORS, AWARDS, POSITIONS HELD, CEREMONIES, STAFF
ARRIVALS/DEPARTURES AND REENLISTMENTS (Continued)**

DECEMBER 1993 (Continued)

HM3 Colin Glynn reported aboard from Port Hueneme, California.

HM2 Carolyn Merritt reenlisted in the United States Navy for six years under the Star Program promoting her to her present rank.

HM2 Carter promoted to his present rank.



Captain S. A. Ralls, DC, USN, reenlisted DT1 M. A. Alvarez in the U. S. Navy and presented him the Sailor of the Half Year Award.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) SUMMARIES OF RESEARCH - FISCAL YEAR 1993		5. TYPE OF REPORT & PERIOD COVERED
7. AUTHOR(s)		6. PERFORMING ORG. REPORT NUMBER NDRI PR 94-08
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Dental Research Institute 2701 Sheridan Road Building 1-H Great Lakes, IL 60088-5259		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Medical Research & Development Command National Naval Medical Center, 8901 Wisconsin Ave Bethesda, Maryland 20889-5606		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (If different from Controlling Office) Chief, Bureau of Medicine and Surgery Navy Department 2300 E Street NW Washington, DC 20372-5300		12. REPORT DATE March 1995
		13. NUMBER OF PAGES 33
		15. SECURITY CLASS. (of this report) UNCLASSIFIED
16. DISTRIBUTION STATEMENT (of this Report) This document has been approved for public release; distribution unlimited.		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) This document has been approved for public release; distribution unlimited.		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Summaries of Research		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Brief summaries of research carried out from October 1992 to 30 September 1993, including presentations, publications and distinguished visitors.		

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)